DISCLOSURE OF THE QUACKERY: TESTING OF THE BACTERICIDAL ACTION OF PRODUCTS BASED ON THE ‘‘HYDRONIC’’ TECHNOLOGY (‘‘INFORMED GLASS’’) ON ATCC STRAINS OF *ENTEROCOCCUS FAECALIS*, *SALMONELLA ENTERITIDIS* AND *CANDIDA ALBICANS.*

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Abstract

To disclose a quackery called “revitalisation of tired water by hydronic technology”, scientific experiments have been conducted with drinking water kept in ‘‘ordinary, everyday-use’’ drinking glasses and so-called ‘informed’ glasses, a patent-protected product supposed to have an effect on the ‘‘structure, vitality and memory of water‘‘. Drinking “informed” water is claimed to have a wide range of positive revitalising health effects (blue informed glass), to facilitate weight loss (red informed glass) and to have a stress-relieving action (green informed glass). Allegedly, by the use of the “orgon methodology”, information is coded into the glass, which action is additionally enforced by the addition of the ‘‘magic life’’ symbol – a specially designed energy condenser which, together with the selected information, is permanently introduced into the liquid contained in the glass. Since the manufacturer claimed the products to have a broad bactericidal action, regardless of the external conditions and completely independent from additional factor that would lead to the activation of the system, the efficacy of the informed drinking glass was tested using standardised, microbiological tests. Respecting the principle of a single-blind test for each of 5 samples of each type of the informed glass, growth reduction factor (RF) (difference log cfu/ml - colony per unit/ml of control glass and log cfu/ml of each informed glass) was determined after 0,2,4,6 and 8 h in spring water experimentally contaminated with standardised ATCC strains of two types of bacteria and one yeast. The results showed a statistically significant bactericidal action of the blue informed glass with all strains - *Enterococcus faecalis* (RF 0.62/0.76), *Salmonella enteritidis* (RF 0.87/0.97), and *Candida albican*s (RF 0.5/0.60) - as opposed to the red and green glasses where this effect was negligible (RF < 0.1). However, when the tests were repeated in complete darkness, none of the three informed glasses showed any bactericidal action. The obtained results indicate a fraud: bactericidal effect is rather a result of photocatalytic action of a hidden component used on purpose in the production of glass or subsequently applied by the use of nanotechnology (possibly antimony trioxide or titanium oxide) than of the so-called ‘‘orgon and hydronic technology’’.

Key words: Nostrums, Water, Quackery, Complementary therapies, Health care fraud, Homeopathy, Self -care

Introduction

There are several commercial products on the market that purport to alter the structure of water in order to help maintain or restore health, youth, and vigor. We have looked into the reputable (peer-reviewed) scientific literature for evidence that would support the claims regarding the structure or action of various brands of **structure-altered waters, and** have found none so far. Those „water revitalisation “ products are primarily aimed at chronic sufferers seeking to improve their quality of life by means of complementary medicine and self-help. They are directed to those who are concerned about their health, but lack the technical background to distinguish science from pseudoscience when the two are closely intertwined. Most of them are nostrums - medicines whose effectiveness is unproven and whose ingredients are usually secret; i.e. quack products. A special place on the Slovenian and Croatian internet market (EU) is held by products based on the „hydronic“ technology, for which a Slovenian pseudoscientist Vili Poznik was awarded a gold medal and a Crystal Globe at the INPEX XVI exhibition in Pittsburgh in 2000.

The subject-matter of this research are his leading commercial products, the so-called „ informed“glass, which are advertised as the handiest products intended for water „revitalisation“. It is a crystalline, manually blown and shaped drinking glass that „improves health, strengthens immunity, and prevents growth of pathogenic bacteria and all kinds of yeasts“ regardless of the external conditions and completely independently from additional factor that would lead to the activation of the system. (Hidroprotect, 2009) The technology of its manufacture is not clearly explained, and the explanations of its efficacy are not in conformance with generally accepted scientific notions.The inventor claims that these are unique glasses on the external side of which a blue, green or red seal is placed, while a „magic life“ symbol is embedded into the bottom. (Vetrovec, 2008). The drinking glasses are then exposed to bombing with concerted information by means of an orgon transmitter in the inventor's laboratory. This information, when once memorised in the drinking glass, has a permanent effect of „vivification of tired or dead water“. The inventor claims that changes occur in the molecular structure of water, i.e. that clusters or clouds of molecules are broken down while the angle between hydrogen bonds is shifted by 10°, which all

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increases the quality of water. (Vetrovec, 2006). Depending on the embedded“ information, each type of drinking glass has a specific effect, thus the blue drinking “informed“ glass (Blue-IG) neutralises detrimental effects of substances dissolved in water and “increases person’s vitality, improves health and enhances body vitality, improves the taste of bread, softens facial skin and alleviates acne“ (Natura-Igm, 2009a), while the green drinking glass (Green-IG) facilitates healthy weight loss (Natura-Igm, 2009b), and the red drinking glass (Red-IG) has an anti-stress effect. (Natura-Igm, 2009c) Colors alone with respect to different wavelengths of each light spectrum have no atributed individual importance neither on the previously described effects on the water, nor on the expected bactericidal effect.

The results of the Allium test have allegedly proven “reduced genotoxicity of municipal water“ in major Slovenian cities; in Ljubljana from 15.53% to 10.76%, and in Celje from 18.75% to 11.76% (Vetrovec, 2006). Successful application in agriculture is supported by “evidence“ that visualised growth of wheat irrigated with informed water was about 10% better than that of the control group. In support of the effect on baker's yeast, it is stated that bread made with revitalised water “leavens much slower“ (Vetrovec, 2001).

No reference to the efficacy of “revitalised water” can be found in Internet databases. Measurable effects of “informed water“ on the human body were recorded solely by gas discharge visualisation method (GDV) which showed that the aura is increased and its fragmentation reduced after drinking water from a vessel made of an informed drinking glass. (Kononenko et al., 2000)

Picture 1: Blue informed drinking glass

Materials and Methods

Considering that a very wide bactericidal action is attributed to “informed“ drinking glasses due to the claim that they “efficiently revitalise water thus preventing growth of pathogenic bacteria and all kinds of yeasts”, the objectives of this research were:

- to test the bactericidal efficacy of all three types of “informed“ glasses with respect to ordinary, everyday-use glasses, by monitoring the reduction in the number of colonies of pathogenic strains of Gram-positive and Gram-negative bacteria and yeasts in time intervals of 2, 4, 6 and 8 h, including the effect on the initial microbial load (0 interval) of samples of water, and
- to test the possible effect of daily light (UV rays) on antimicrobial efficacy of “informed“ glasses in order to eliminate the possible photocatalytic effect of intentionally or incidentally used but undeclared or hidden compounds.

The experimental part of the research was carried out in the microbiological laboratory of the Section for Microbiology of Foodstuffs and General Use Items of the Croatian Institute of Public Health, which has been accredited by the Croatian Accreditation Agency. Five sets of glasses were used in the experiment, each set containing an ordinary (control) glass and a blue, green and red informed glass. Before the experiment, glasses were sterilised in a MELAG Euroklav 23 V-S autoclave to prevent initial contamination by microorganisms. Non-chlorinated spring water in a glass bottle, bacteriologically tested using the membrane filtration method, was used in the experiment.

Bactericidal efficacy testing was conducted in the TELSTAR Bio-II-A biological cabinet using standard microbiological methods and standard strains of microorganisms grown on appropriate selective media: *Salmonella enteritidis* ATCC 13076 –XLD (Xylose Lysine Desoxycholate agar), Biolife; *Enterococcus faecalis* ATCC 29212 –KEA (Kanamycin Esculin Azide agar), *Candida albicans* ATCC 10231 - Sabouraud Chloramphenicol agar, Biolife.

The first inoculation of contaminated water from glasses onto selective media was marked as zero hour and used for control of the introduced microorganism count. Water in informed drinking glasses contained approximately the same microorganism count/ml as that in the control drinking glass. The above procedure was repeated after 2, 4, 6 and 8 h. After 24 hours of incubation, the number of grown colonies was counted for each time interval and expressed in cfu/ml (colony forming unit). During the time-intervals, the drinking glasses were exposed to daylight and kept at the temperature of 24 ºC. The same procedure was used with all microorganisms, with pertaining selective media, in the same time-intervals, in accordance with the applicable norms HRN EN 1040, ISO 6579:2002, EN ISO 6579:2002 and ISO/TS 16649-3:2005. In order to exclude photocatalytic effect, the experiment was repeated in darkness.

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Measurements were carried out in all five sets of glasses, three times in each drinking glass, and the results, for easy reference, were expressed only as an arithmetic mean based on 15 measurements of the number of colonies in each informed glass as an average cfu/ml. The results are presented in Tables 1-6 containing basic parameters of descriptive statistics and the arithmetic mean of the reduction factor value (RF=difference log cfu/ml of ordinary glass and log cfu/ml of each informed glass (RF)). The statistical significance of the number of colonies in daylight and dark conditions were determined by virtue of Students t-test using the SPSS 15.0 programme.

Results

***Enterococcus faecalis* ATCC 29212**
Table 1 Reduction factor (RF) for ***Enterococcus faecalis* ATCC 29212**– daylight after 0, 2, 4, 6 and 8 hours
Table 2 Reduction factor (RF) for ***Enterococcus faecalis* ATCC 29212 -** *darkness* after 0, 2, 4, 6 and 8 hours

S***almonella enteritidis* ATCC 13076**
Table 3 Reduction factor (RF) for ***Salmonella enteritidis* ATCC 13076** – daylight after 0, 2, 4, 6 and 8 hours
Table 4 Reduction factor (RF) for ***Salmonella enteritidis* ATCC 13076** – *darkness* after 0, 2, 4, 6 and 8 hours

***Candida albicans* ATCC 10231**
Table 5 Reduction factor (RF) for ***Candida albicans* ATCC 10231** – daylight after 0, 2, 4, 6
Table 6 Reduction factor (RF) for ***Candida albicans* ATCC 10231** – *darkness* after 0, 2, 4, 6

Table 1: Reduction factor (RF) for ***Enterococcus faecalis* ATCC 29212**– daylight after 0, 2, 4, 6 and 8 hours

t	CONTROL GLASS		GREEN I-GLASS		RED I-GLASS		BLUE I-GLASS	
	cfu/ml	log cfu/ml	log cfu/ml	RF	log cfu/ml	RF	log cfu/ml	RF
0 h	1200	3.08	3.04	**0.04**	3.08	**0**	3.02	**0.06**
2 h	1020	3.00	3.00	**0.01**	2.99	**0.01**	2.60	**0.40**
4 h	900	2.95	2.78	**0.17**	2.76	**0.19**	2.36	**0.59**
6 h	750	2.87	2.71	**0.16**	2.72	**0.15**	2.25	**0.62**
8 h	700	2.84	2.70	**0.14**	2.70	**0.14**	2.08	**0.76**

Table 2: Reduction factor (RF) for ***Enterococcus faecalis* ATCC 29212 -** *darkness* after 0, 2, 4, 6 and 8 hours

t	CONTROL GLASS		GREEN I-GLASS		RED I-GLASS		BLUE I-GLASS	
	cfu/ml	log cfu/ml	log cfu/ml	RF	log cfu/ml	RF	log cfu/ml	RF
0 h	1100	3.04	3.02	**0.02**	3.00	**0.04**	3.02	**0.02**
2 h	900	2.95	2.95	**0.02**	2.93	**0.02**	2.95	**0**
4 h	850	2.92	2.90	**0.02**	2.90	**0.02**	2.92	**0**
6 h	600	2.78	2.76	**0.01**	2.77	**0.01**	2.78	**0**
8 h	400	2.60	2.47	**0.13**	2.49	**0.11**	2.57	**0.03**

Table 3: Reduction factor (RF) for *Salmonella enteritidis* ATCC 13076 – daylight after 0, 2, 4, 6 and 8 hours

t	CONTROL GLASS		GREEN I-GLASS		RED I-GLASS		BLUE I-GLASS	
	cfu/ml	log cfu/ml	log cfu/ml	RF	log cfu/ml	RF	log cfu/ml	RF
0 h	2000	3.30	3.30	**0**	3.30	**0**	3.30	**0**
2 h	1700	3.23	3.20	**0.03**	3.17	**0.06**	2.90	**0.3**
4 h	1700	3.23	3.23	**0**	3.14	**0.09**	2.77	**0.46**
6 h	1500	3.17	3.11	**0.06**	3.08	**0.09**	2.30	**0.87**
8 h	1400	3.14	3.00	**0.14**	2.95	**0.19**	2.17	**0.97**

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Table 4: Reduction factor (RF) for ***Salmonella enteritidis* ATCC 13076** – *darkness* after 0, 2, 4, 6 and 8 hours

t	CONTROL GLASS		GREEN I-GLASS		RED I-GLASS		BLUE I-GLASS	
	cfu/ml	log cfu/ml	log cfu/ml	RF	log cfu/ml	RF	log cfu/ml	RF
0 h	2100	3.32	3.32	**0**	3.31	**0.01**	3.30	**0.02**
2 h	2100	3.32	3.30	**0.02**	3.27	**0.05**	3.30	**0.02**
4 h	1900	3.27	3.25	**0.02**	3.20	**0.07**	3.27	**0**
6 h	1900	3.27	3.25	**0.02**	3.17	**0.10**	3.25	**0.02**
8 h	1600	3.20	3.17	**0.03**	3.14	**0.06**	3.17	**0.03**

Table 5: Reduction factor (RF) for ***Candida albicans* ATCC 10231** – daylight after 0, 2, 4, 6 and 8 hours

t	CONTROL GLASS		GREEN I-GLASS		RED I-GLASS		BLUE I-GLASS	
	cfu/ml	log cfu/ml	log cfu/ml	RF	log cfu/ml	RF	log cfu/ml	RF
0 h	1230	3.08	3.08	**0**	3.08	**0**	3.07	**0.01**
2 h	980	2.99	2.81	**0,18**	2.90	**0.09**	2.59	**0.40**
4 h	800	2.90	2.77	**0,13**	2.90	**0**	2.47	**0.43**
6 h	790	2.89	2.77	**0,12**	2.87	**0.02**	2.30	**0.59**
8 h	600	2.77	2.76	**0,01**	2.77	**0**	2.17	**0.60**

Table 6: Reduction factor (RF) for ***Candida albicans* ATCC 10231** – *darkness* after 0, 2, 4, 6 and 8 hours

	CONTROL GLASS		GREEN I-GLASS		RED I-GLASS		BLUE I-GLASS	
	cfu/ml	log cfu/ml	log cfu/ml	RF	log cfu/ml	RF	log cfu/ml	RF
0 h	1300	3.11	3.11	**0**	3.10	**0.01**	3.11	**0**
2 h	1250	3.09	3.09	**0**	3.07	**0.02**	3.09	**0**
4 h	1200	3.08	3.07	**0,01**	3.04	**0.04**	3.07	**0.01**
6 h	1180	3.07	3.04	**0,03**	3.03	**0.04**	3.04	**0.03**
8 h	1030	3.01	3.95	**0,06**	3.00	**0.01**	2.99	**0.02**

Discussion

The results of the research are very far from those claimed by the patent-owner and sellers. When water was contaminated with a standard strain of *Salmonella enteritidis* under daylight conditions, the greatest bactericidal efficacy with respect to the control glass was recorded with Blue-IG. The greatest reducing factor was observed (RF=0.87 i RF=0.97) in time- intervals of 6 and 8 hours, with a tendency of increase in time. Bactericidal efficacy of Red-IG and Green-IG in the same time-interval was very low and did not significantly differ from the efficacy of the control glass (Table 1). However, in dark conditions, the number of colonies of *Salmonella enteritidis* with respect to the control glass was not reduced either in Red-IG or Green-IG and, contrary to the properties attributed to it, neither in Blue-IG, where reduction factor values were insignificant and ranged from RF=0 to RF=0.10 without a tendency of increase (Table 2). The difference in the number of colonies determined by t-test after 6 hours in Blue-IG at daylight compared to that in the darkness (daylight/darkness) is statistically significant with a risk lower than 1% (t=58.916; df=8; P=0.000). The same results were also confirmed after 8

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hours where the difference in bacterial count determined by t-test was also statistically significant with a risk lower than 1% (t=57.735; df=8; P=0.000) and with almost the same t-ratio as in the 6-hour interval.

The reduction of the number of colonies in water contaminated with the standard strain of *Enterococcus faecalis*, exposed to the action of informed glasses at daylight, was the greatest with Blue-IG, where the following reduction factors were recorded (RF=0.62 and RF=0.76) in the time-intervals of 6 and 8 hours. The bactericidal effect of Red-IG and Green-IG differed insignificantly from that of the control glass (Table 3). When conditions were changed (no daylight), the number of colonies of *Enterococcus faecalis* with respect to the number of colonies in the control glass (daylight/darkness) was not significantly reduced either in Red-IG, Green-IG, or even in Blue-IG, which can be seen from Table 4 which shows that reduction factors were insignificant in all three glasses and ranged from RF=0 to RF=0.13. No tendency of increase was recorded in different time intervals as opposed to daylight. It was also established that under changed conditions (daylight/darkness) the difference in the reduced number of colonies after 6 hours in Blue-IG was statistically significant with a risk lower than 1% (t=47.000; df=8; P=0.000) (as was after 8 hours (t=36.515; df=8; P=0.000) and with a t-ratio lower than in the 6-hour interval.

Since fungicidal efficacy was also attributed to the product, the results obtained in experiments with pathogenic bacteria were checked on one standard yeast strain. In experiments with *Candida albicans* that were designed in the same manner and carried out in daylight, the greatest fungicidal effect was expressed by the reduction factor of the number of colonies with respect to the number of colonies in the control glass obtained with Blue-IG, with a minimum increase in reduction factor in time-intervals, where the greatest values were determined in the time-intervals of 6 and 8 hours (RF=0.59 and RF=0.60). Fungicidal efficacy of the other two glasses did not differ significantly from that of the control glass (Table 5). Under changed conditions (no daylight), the number of *Candida albicans* colonies with respect to those in the control glass (daylight/darkness) was not significantly reduced either in Red-IG, Green-IG, or Blue-IG. It can be concluded from Table 6 that reduction factor values for all three types of glasses are insignificant and range from RF=0 to RF=0.06 and do not show a tendency to increase as do those obtained under daylight conditions. T-test on Blue-IG established a statistically significant difference in efficacy with a risk lower than 1% expressed as the reduction factor obtained after 6 hours (daylight/darkness) (t=34.888; df=8; P=0.000), as well as after 8 hours (t=52.931; df=8; P=0.000), with a greater t-ratio than in the 6-hour interval.

Regretfully, we have nothing to compare the obtained results to. The inventor did not publish any foundations of his conclusion on the bactericidal action of the product, and we could not find a single published paper on the related research. The only results that were available to us were those regarding a non-scientific experiment where, when industrially contaminated water was kept for a short period of time in the product which was a precedent of the informed glass (Blue-IG 2000), after 48 hours of incubation (at 37 ºC in a cupboard!) there has been a 25-percent (!) decrease in the initial bacterial count and a 100-percent destruction of moulds compared to the sample that was not kept in the informed product (Vetrovec, 2001). The obtained results are in any case interesting. If experiments were carried out only in daylight and only with the basic model of Blue-IG, we could speculate that the bactericidal action of the "informed"drinking glass and the efficiency of the "hydronic" technology are undoubtedly proven. The comparative results showing no bactericidal and fungicidal effects of Red-IG and Green-IG glass, if this is not "disregarded in the name of a higher purpose", might be explained by a possible uncoordinated effect of subsequently embedded information, and by the absence of the foreseen synergistic effect. However, the fact that a reduction in the number of colonies was recorded under daylight conditions in one type of glass and the complete absence of reduction in all three types of glasses put in dark, provided a basis for the assumption that the reduction of bacteria and yeasts in Blue-IG was most probably the result of a photocatalytic effect of a constituent which was not anywhere stated by the producer. This constituent is probably Sb_2O_3 which is added to decolour glass during technological process and which, under the influence of UV rays, shows photocatalytic properties (Markan, 1955; Nalwa, 2005) thus possibly leading to the reduction of bacterial count. It is possible that the patent-owner is not acquainted with its presence, since he did not declare the analysis of the chemical composition of the product. However, we should not exclude the possibility that a selected compound with a known bactericidal action when applied in a nano-layer, used for example in the manufacture of wall coatings of operating rooms and windscreens of cars and airplanes, was subsequently applied to the walls of the glass using nanotechnology. As a matter of fact, in the world, at the present time, in the development of the applied science the greatest investments are made in nanotechnology which is based on a scientific discipline called nanoscience (Tsu, 2001; Tsu, 2003). It has been widely applied in nanomedicine where nanoparticles are used for different purposes: as fluorescent biomarkers, for transport of medicines and gene therapy, for biodetection of pathogens, for detection of proteins, for research into the DNA structure, for tissue modelling, in antitumour therapy, for separation and purification of biological molecules and cells, as MRI (Magnetic Resonance Imaging) contrast media (Bogunia-Kubik, 2002), and especially for selective destruction of certain species of bacteria, viruses and yeasts by means of cellular respiration blocking (Binning et al., 2002). Future research on the efficacy of Blue-IG might be directed towards proving the possible presence of nanoparticles such as Sb_2O_3 or, especially, TiO_2. Namely, this is a widely used compound which causes photocatalysis due to the effect of ultraviolet light (at a wavelength shorter than 388 nanometres), that excites electrons in TiO_2 to shift to a higher energy state and conductivity band, whereby free electrons and free electron holes appear. All of them react with oxygen and water, resulting in superoxide ions and hydroxide radicals' production. The latter are highly reactive and oxidise, i.e. destroy organic molecules, eventually decomposing them to carbon dioxide and water. Considering that microorganisms are also destroyed in this way, all coatings of this kind are also called antibacterial or antimicrobial. This might explain the reduction effect observed with Blue-IG (Fox and Dulay, 1993; Harada et al.1990). In the evaluation of the efficacy of application of such theoretical constructions, it is not possible to avoid questioning the principal thesis on revitalisation of "tired" water by "hydronic" technology by virtue of crushing large molecular clusters of up to 400 water molecules down to smaller groups which, in such form, enter more easily into cells through the "hexagonal door". Namely, according to scientific notions, mutual binding of neighbouring molecules of water occurs through hydrogen bonds that break up continuously and are formed again, a typical bond thereby having a life span measured in picoseconds, which excludes the possibility of formation and maintenance of large "clusters" of molecules in so-called tired waters. Water also enters cells in form of individual

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molecules through aquaporin transcellular channels meant for water transport, which, from the scientific point of view, makes the thesis that when we "pour water into an informed glass, clusters of molecules are de-grouped into smaller groups of molecules which penetrate cells more easily "(Vetrovec,2008), least to say, an unacceptable explanation of beneficial water-revitalising effect.

Since the manufacturer neglected to declare the composition of his products, and as there are no available data on the applied technological procedures, nor has a single shred of scientific evidence on the efficacy of this very expensive product been provided, additional arguments to the critics of alternative medicine who speak of this as a simple fraud has been provided (Marusic, 2004). Even more so, it might not far be from truth that none of these water structure-altering methods has any significant support in the scientific communities of chemistry, biochemistry, or physiology, nor are they even considered worthy of investigation. The only places one is likely to see the evidence advocating these views and standpoints, are the literature (and websites) intended to promote the sale of these products to consumers in the notoriously credulous "alternative" health market (Lower, 2009.) But there is no plausible basis for biological persistence or activity of alleged water memory of "informed" water.

In spite of this fact, we believe that the value of our investigation lies in the endeavour to establish a very strict and appropriate methodology which would be applicable also in the evaluation of real efficacy of similar products on the market, aiming to distinguish valuable (if any) products from those worthless, since giving false hope to chronically and seriously ill is the most cruel form of quackery as it may stray the victims far away from other proven and efficient complementary or alternative treatments (Sackett et al., 1996). Through publishing of our findings we hope to make potential customers better equipped to make their own decisions about the worthlessness of these products. We are aware that "informed glasses", "Orgon energy" and "memory of water" belong to a belief system and not to science. Unfortunately they might persist in the community because its practitioners and adherents will ignore negative data stemming from laboratory or clinical trials. To conclude, as long as patent-owners can not provide valid scientific proof of the effectiveness of their products, they basically cheat patients out of their money (Marusic, 2004). In the "informed" glasses case, this quackery costs 25 Euros per glass and more then 700 euros in case you decide to purchase "a hydronic vitalizer" - i.e. a house "informed" water supply system manufactured according to the original Hydronic technology and best described as a fool's tax.

Conclusions

Antimicrobial efficacy of hydronic technology was tested using pure strains of Gram-positive bacteria *Enterococcus faecalis* ATCC 29212, Gram-negative bacteria *Salmonella enteritidis* ATCC 13076 and the yeast *Candida albicans* ATCC 10231. The following conclusions can be made:

The research did not prove any antimicrobial efficacy of the two out of three informed drinking glasses (Red-IG and Green-IG) with respect to ordinary glass, under daylight conditions, in time-intervals of 2, 4, 6 and 8 h, including the initial microorganism load of water in all drinking glasses. The research proved an antimicrobial efficacy of Blue-IG with respect to ordinary drinking glass, under daylight conditions, in time-intervals of 2, 4, 6 and 8 h, including the initial microorganism load of water in all glasses. The reduction of all standard strains used in the testing of antimicrobial efficacy of Blue-IG at daylight was statistically significant. The research did not prove antimicrobial efficacy of none of the three informed drinking glasses with respect to ordinary glass, under dark conditions, in time-intervals of 2, 4, 6 and 8 h, including the initial microorganism load of water since there was no significant reduction of microorganisms in the given time-intervals. Further research should be conducted to reexamine alleged „significant reduction of genotoxicity of municipal water" with standardized sophisticated exotoxicity tests like *Daphnia Magna* and *Lemna minor* toxicity test and Ames test, because due to observed photocatalitic bactericidal effect it is more expected to observe the inhibition and reduction (toxic) effect on the higly sensitive testing organisms then "reduction of genotoxicity" allegedly proved with robust Allium test.

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